An exact approach to extend network lifetime in a general class of wireless sensor networks

Titre	An exact approach to extend network lifetime in a general class of wireless sensor networks
Type de publication	Article de revue
Auteur	Castaño, Fabián [1], Rossi, André [2], Sevaux, Marc [3], Velasco, Nubia [4]
Editeur	Elsevier
Type	Article scientifique dans une revue à comité de lecture
Année	2018
Langue	Anglais
Date	Avril 2018
Numéro	433-434
Pagination	274-291
Titre de la revue	Information Sciences
ISSN	0020-0255
Mots-clés	Adjustable sensing ranges [5], Column Generation [6], Directional sensors [7], Multiple target coverage [8], wireless sensor networks [9]
Résumé en anglais	This paper provides a general framework to model and optimize lifetime maximization problems in wireless sensor networks with sensors having specialized capabilities like the ability to adjust their sensing range, change their directions, etc. In order to identify the set of tasks that a sensor carries out, the concept of role is introduced. These roles include sensor direction, sensing range, communication mode and combinations of these. The purpose is to identify schedules, represented as the allocation of roles to the sensors and a time interval for assuming such roles, while covering targets and transmitting signals to the base station. To do so, a large scale linear programming model is proposed and solved through an exact approach based on column generation, which is complemented with a branch-and-cut procedure used to address the pricing subproblem. The proposed approach is tested on an extensive set of randomly generated instances used to evaluate its performance. Computational results show the potential of the proposed approach for medium-large size instances for which it is possible to compute either the optimal or good quality solutions in short computational times.
URL de la notice	http://okina.univ-angers.fr/publications/ua16582 [10]
DOI	10.1016/j.ins.2017.12.028 [11]
Lien vers le document	http://www.sciencedirect.com/science/article/pii/S0020025517311532 [12]

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